24. O'Malley PM, Wagenaar AC. Effects of minimum drinking age laws on alcohol use, related behaviors and traffic crash involvement among American youth: 1976–1987. *J Stud Alcohol.* 1991; 52:478–491.

25. Asch P, Levy DT. Does the minimum drinking age affect traffic fatalities? *J Policy Anal Manage.* 1987;6:180–192.

26. Legge JS Jr, Park J. Policies to reduce alcohol-impaired driving: evaluating elements of deterrence. *Soc Sci Q.* 1994; 75:594–606.

27. Houston DJ, Richardson LE Jr, Neeley GW. Legislating traffic safety: a pooled time series analysis. *Soc Sci Q.* 1995;76:328–345.

28. Houston DJ, Richardson LE Jr, Neeley GW. Mandatory seat belt laws in the states: a study of fatal and severe occupant injuries. *Eval Rev.* 1996;20: 146–159.

29. Tippetts AS, Voas RB, Fell JC, Nichols JL. A meta-analysis of.08 BAC laws in 19 jurisdictions in the US. *Accid Anal Prev.* 2005;37:149–161.

30. Chorba TL, Reinfurt D, Hulka BS. Efficacy of mandatory seat-belt use legislation. *JAMA.* 1988;260:3593–3597.

31. Wagenaar AC, Maybee RG, Sullivan KP. Mandatory seat belt laws in eight states: a time-series evaluation. *J Safety Res.* 1988;19:51–70.

32. Houston DJ, Richardson LE Jr. Traffic safety and the switch to a primary seat belt law: the California experience. *Accid Anal Prev.* 2002;34:743–751.

33. Zlatoper TJ. Determinants of motor vehicle deaths in the United States: a cross-sectional analysis. *Accid Anal Prev.* 1991;23:431–436.

34. US National Highway Traffic Safety Administration. Fatality Analysis Reporting System Web site. Available at: http://www-fars.nhtsa.dot.gov/Main/index.aspx. Accessed September 7, 2008.

35. Breusch TS, Pagan AR. A simple test for heteroscedasticity and random parameter estimates variation. *Econometrica.* 1979;47:1287–1294.

36. Wooldridge JM. *Econometric Analysis of Cross Section and Panel Data.* Cambridge, MA: MIT Press; 2002.

37. *Accident Facts.* Chicago, IL: National Safety Council; 1990–2006.

38. *Title and Registration Book: A Summary of Motor Vehicle Laws and Regulations.* Costa Mesa, CA: National Automobile Dealers Association; 1990–2002.

39. *Traffic Safety Facts.* Washington, DC: US National Highway Traffic Safety Administration; 1990–2006.

40. US National Institute on Alcohol Abuse and Alcoholism Web site. Available at: http://www.niaaa.nih.gov/Resources/DatabaseResources/QuickFacts/AlcoholSales/consum03.htm. Accessed October 14, 2007.

41. *Highway Statistics.* Washington, DC: US Federal Highway Administration; 1990–2006.

42. US Bureau of Labor Statistics. Consumer Price Index Web site. http://www.bls.gov/cpi. Accessed September 7, 2008.

43. *Statistical Abstract of the United States.* Washington, DC: US Census Bureau; 1990–2006.

44. Peltzman S. The effects of automobile safety regulation. *J Polit Econ.* 1975;83:677–725.

45. Graham JD, Garber S. Evaluating the effects of automobile safety regulation. *J Policy Anal Manage.* 1984;3:206–224.

46. *Trucks and Transportation.* Lansing: Michigan Dept of Transportation. 1998. Available at: http://web.archive.org/web/20070310171845/http://www.michigan.gov/documents/truckinfo_16563_7.pdf. Accessed September 2, 2008.

Motorcycle Helmet Laws in the United States From 1990 to 2005: Politics and Public Health

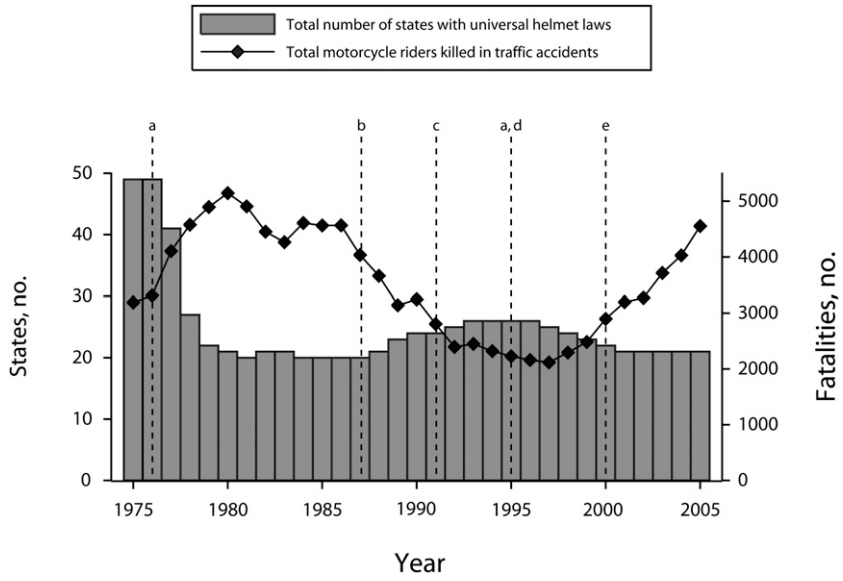
Jenny Homer, MPA, MPH, and Michael French, PhD

The passage of universal helmet legislation requiring motorcycle riders of all ages to wear helmets is a timely and controversial issue with far-reaching public health implications, especially as the number of motorcycle fatalities continues to rise. In 2008, only 20 states had a universal helmet policy, an effective safety measure for reducing motorcycle fatalities and serious injuries.

We used state-specific longitudinal data for the continental United States from 1990 through 2005 to determine which industry, political, economic, and demographic factors had a significant influence on the enactment of universal helmet policies. Our findings suggest that political climate and ideology are important predictors of helmet policies. (*Am J Public Health.* 2009;99: 415–423. doi:10.2105/AJPH.2008.134106)

AFTER DECLINING throughout the 1980s and early 1990s, fatal motorcycle crashes began increasing in the late 1990s.[1] The number of motorcycle riders killed in 2006 (4810) accounted for the highest share (11%) of total traffic fatalities ever.[2] Recent trends are alarming and should generate interest in public health and policy interventions to reduce the risks associated with motorcycle riding.

Studies have consistently shown that a motorcycle helmet is a vital piece of equipment for decreasing the risk of death and brain injuries[3–7] and that helmet laws are significantly associated with lower fatalities.[8–10] One study estimated that motorcycle helmets lower the risk of death by 42% and head injury by 69%.[4] Yet, few traffic policies have been as controversial as universal motorcycle helmet laws, which require every rider to wear a helmet regardless of his or her age. Motorcycle rights groups first organized and challenged the laws in court after Congress withheld highway construction funding from states without universal helmet laws in 1967.[9,11] The federal government has taken various actions since then, decreasing (or increasing) funding for states without (or with) universal helmet laws, and state governments have been responsive to these incentives (Figure 1). The last change occurred in 1995 when Congress repealed financial incentives for states without universal helmet laws.[13] As of April 2008, 20 states had universal helmet laws, 27 required only young riders to wear helmets, and 3 (Illinois, Iowa, and



Note. The congressional actions (dotted lines) throughout the time period depicted were as follows: (a) repealed financial incentives for states with universal helmet laws, (b) raised the national maximum speed limit on rural interstates from 55 to 65 miles per hour, (c) instituted financial incentives for states with universal helmet laws, (d) repealed the national maximum speed limit, and (e) imposed financial penalties on states without a 0.08 blood alcohol concentration limit. Congress first instituted financial incentives for states with universal helmet laws in 1967.

Source. National Highway Traffic Safety Administration[1] and the Insurance Institute for Highway Safety.[12]

FIGURE 1—Number of states, including the District of Columbia, with universal helmet laws, total rider fatalities, and congressional actions mandating state traffic policies: 1975–2005.

New Hampshire) had no mandatory helmet policy for any riders.[12] An excellent discussion of the constitutional issues surrounding motorcycle helmet policies was presented in 2 recent *Journal* articles.[14,15]

Although many studies have evaluated the public health implications of these policies, little is known about the determinants of helmet policies and the role played by interest groups, the motorcycle industry, and politics. Here we present new information on the policymaking process by identifying how these factors relate to state helmet laws.

Conceptual Framework

In public choice theory, individuals make political choices to advance their own interests and maximize benefits.[16,17] Legislators need votes and political resources from constituents, whereas constituents and interest groups seek laws that serve their interests.[17,18] Those active in politics believe that the time and resources they invest in lobbying and political activities are outweighed by the potential gains produced by these activities. Because large groups have more-diverse objectives (and a small stake in a particular policy outcome), single-interest groups with a narrow focus and a large personal stake will often be more effective in influencing policy.[19,20]

This theory can be applied to explain the status of universal helmet laws in the United States. Anecdotal evidence has long suggested that the lack of universal helmet laws in some states is largely the result of activism and lobbying by rider groups.[21,22] Although many of the positions challenging the constitutionality of universal helmet laws were largely rejected in the courtroom,[23] these arguments became more successful once the debate moved to state legislatures. This shift has effectively turned helmet policy into a political issue and subjected it to the influence of interest groups, public opinion, and partisan politics. At the state level, rider groups are very well organized and use grassroots tactics such as Internet postings, newsletters, and e-mail messages to support candidates.[21] Riders who want the right to choose to use a helmet may be the most passionate about a universal helmet law. Others may still have an important interest, but the benefits of becoming politically active are often insufficient to warrant involvement by nonriders or riders who regularly wear helmets.

Previous studies have determined that economic and political constraints in addition to interest group activities have the greatest influence on regulatory policies.[18,24,25] These economic and political factors, which include the partisan makeup of the government and public opinion, affect the policy options that are feasible and acceptable on a practical and ideological level.[24] For example, Democratic Party strength is generally associated with more-liberal public policies[26] such as increased Medicaid spending,[27] whereas Republicans tend to favor pro-business policies, limited government, and individual rights.[28,29]

Florida

Florida's universal helmet law was first implemented in September 1967.[12] For over 30 years, motorcycle rider groups led by American Bikers Aiming Toward Education (ABATE) lobbied the Florida legislature to amend the law. One argument unique to Florida and states with similar climates

was that wearing a helmet in the intense heat was especially burdensome.[30] An amendment of Florida's universal helmet law nearly passed several times, including one occasion in 1985 when it was vetoed by Governor Bob Graham, a Democrat.[31] The state legislature switched from Democratic to split control in 1992 and to Republican control in 1996. These political developments combined with a growing motorcycle population, involvement of ABATE in state campaigns, and changes in federal incentives created a legislative climate that was more supportive of policies focused on individual rights.[32,33]

In 2000, the legislature passed and Governor Jeb Bush, a Republican, signed a bill amending Florida's helmet policy to apply only to those riders who are either under age 21 years or without a medical benefit of at least $10 000 on their insurance policy. Governor Bush expressed his political perspective on the issue as follows:

> I believe government oversteps its legitimate role when it excessively interferes with personal freedom. . . . Of course we could significantly reduce deaths, injuries, or health risks . . . through a mandate that all individuals exercise, wear sunscreen, stop smoking and learn to swim; yet we impose no such requirements.[34(p14a)]

The amendment passed despite objections from several organizations, including the AAA Auto Club and the Brain Injury Association of Florida.[34,35] Florida requires special license tags for young riders to enable law enforcement to determine more easily whether an unhelmeted rider is underage. Studies have found that motorcycle registrations and fatalities increased in Florida after the universal helmet policy was amended.[36,37] One evaluation estimated that in the year after the law change, rider fatalities rose 21.3% after adjusting for registrations.[36]

METHODS

Outcome Measure

Our research was based on state-specific longitudinal data for the continental United States from 1990 through 2005 and constituted, to our knowledge, the first empirical study of the determinants of universal helmet policies. The sources and definitions of all variables are available as a supplement to the online version of this article at http://www.ajph.org.

We created a dichotomous outcome variable set equal to 1 for those states with universal helmet laws that require riders of all ages to wear a helmet and to 0 for states that do not have that requirement.

Motorcycle-Specific Variables

We expected states with strong motorcycle advocates to be less likely to have a universal helmet policy. Because the ability of a special interest group to achieve its aims is affected by its size and the strength of the opposition, we included several variables to capture different dimensions of interest-group lobbying.[19,38] The number of motorcycle registrations represented the size of the riding population (and, to a legislator, potential voters), the value of the motorcycle-related retail marketplace represented the economic power of the motorcycle industry, the number of BMW Motorcycle Owners of America (MOA) members represented involvement in a vocal national rider group, and the number of physicians was a proxy for a pro-helmet sentiment, given that trauma surgeons have traditionally been active supporters of universal helmet laws.[39] These variables were all adjusted by population. The models also contained an indicator variable for whether a state hosted 1 of the 4 largest motorcycle rallies in the United States, which attract thousands of riders and generate considerable revenue for the state. To account for the possibility that border states influence policy decisions,[40] we constructed a variable for the percentage of neighboring states that had a universal helmet policy in a given year.

Most of the motorcycle-specific variables were only weakly correlated. After we adjusted for population, the correlation between MOA members and motorcycle registrations was 0.61 and the correlation between motorcycle registrations and the value of the motorcycle-related retail marketplace was 0.61. All other correlations between the motorcycle-specific variables were less than 0.60.

Political Variables

States with Republican governors or with Republican majorities in the state legislature were expected to be less likely to have universal helmet policies. We also created an indicator variable set equal to 1 if Republicans had gained control of the state legislature since the previous year and to 0 otherwise. The average annual salary of state lawmakers was included, because better-compensated legislatures may devote more time and resources to developing policies that meet constituents' needs.[24,41] The percentage of respondents in each state identifying themselves on an ideological scale (liberal, moderate, and conservative) represented public opinion in the models.[42]

Traffic Policy Variables

The models contained indicator variables for whether the state had a rider education program that was mandatory for all or some riders, a 0.08 blood alcohol concentration per se law, and primary enforcement of seatbelt laws. As of 2006, 47 states had legislated motorcycle rider education programs, which are intended to prevent or reduce the likelihood of crashes.[43] These courses are required for certain riders (e.g., young riders) before licensing in some states.[43] States with mandatory rider education programs may invest more resources in motorcycle safety and may therefore be more likely to have a universal helmet policy. If the presence of stringent traffic safety policies reflects an environment supportive of government intervention to reduce motor vehicle fatalities, we would expect states with strict seatbelt or drunk driving policies to have universal helmet laws.

Other Explanatory Variables

Indicator variables were used to identify states in the Northeast, South, Midwest, and West census regions. To account for road, demographic, and environmental conditions, the analysis also included measures for per capita alcohol consumption, average annual temperature, average annual

precipitation, rural vehicle miles traveled per 1000 residents, urban vehicle miles traveled per 1000 residents, lane miles per mile of public road, percentage White residents, and personal income per capita. We controlled for health expenditures per 1000 residents older than 15 years, because we expected states concerned with or heavily invested in health care to be more likely to have a universal helmet law.

Analysis

We assembled data from 1990 to 2005 to construct a large, pooled cross-sectional time-series data set. Given that the dependent variable was dichotomous, a univariate probit technique was used to estimate the following equation:

$$(1)\quad \Pr(Y_{t+1} = 1 | \mathrm{M}_t, \mathrm{P}_t, \mathrm{L}_t, \mathrm{S}_t) = f(M_t\beta_M + P_t\beta_P + L_t\beta_L + S_t\beta_S),$$

where Y_{t+1} represents whether a state had a universal helmet policy in year $t+1$ (t=1990–2004), M is a vector of motorcycle-specific variables, P is a vector of political variables, L is a vector of traffic and alcohol laws, and S is a vector of road, environmental, and demographic variables in year t. Year and regional effects were included in all models. The explanatory variables were 1 year behind the helmet policy variable to account for a lag in policymaking. Standard errors were adjusted for clustering at the state level. The coefficients on the vectors M_t' and P_t' indicated the impact of motorcycle sentiments and the political system on the likelihood that a state had a universal helmet policy.

Equation 1 could have been estimated with logit instead of probit. We chose the probit technique because marginal effects from probit are easier to interpret than are odds ratios from logistic regression when the explanatory variables are continuous. Nevertheless, the qualitative results from the logistic regression were similar to the probit results and are discussed in the sensitivity analysis. Stata Statistical Software, release 9, was used for the statistical analysis (StataCorp, College Station, TX).

RESULTS

The differences between state and year combinations with and without universal helmet policies are summarized in Table 1. States without universal helmet laws had more per capita BMW MOA members, had more per capita motorcycle registrations, had a higher normalized value of the motorcycle-related retail marketplace, and were more likely to host a major motorcycle rally. They also had fewer per capita physicians and fewer neighboring states with universal helmet laws. These bivariate differences suggested that states without universal helmet policies had stronger motorcycle representation in terms of membership and economic power than did states with universal helmet policies.

The regression results from the multivariate analysis are shown in Table 2. The note reports the baseline proportions to allow for easier interpretation of the marginal effects. Regression coefficients, robust standard errors (in parentheses), and marginal effects calculated at the mean values for all other regressors are reported.

The first model estimated the association between the independent variables and the likelihood that a state had a universal helmet law. An additional MOA member per 100 000 residents in a state increased the probability of having a universal helmet law by 2.3 percentage points, and an additional registered motorcycle per 1000 residents decreased the likelihood of having a universal helmet policy by 5.8 percentage points. The probability that a state had a universal helmet law decreased by 0.9 percentage points for every additional $1000 per 1000 residents in the motorcycle-related retail marketplace. As expected, states with more physicians per capita and a greater concentration of neighboring states with universal policies were more likely to have a universal helmet policy.

Almost all of the political and traffic policy variables were significantly related to the likelihood that a state had a universal helmet policy. Quantitatively, states with a Republican governor were 22% (–0.102/0.467=–0.218) less likely to have a universal helmet policy than were states without a Republican governor. Republican control in the state legislature was negatively related to having a universal helmet policy, whereas a recent change in party control in the legislature, compensation of state legislators, and a more liberal population were positively related to having a universal helmet policy. The likelihood of having a universal helmet policy was 40.3 percentage points lower in states that had mandatory rider education programs. Because all states had 0.08 blood alcohol concentration per se laws by 2004, states that had implemented such laws earlier were also more likely to have universal helmet policies. Having a primary seatbelt law was positively related to having a universal helmet policy.

In terms of the other explanatory variables, states with greater per capita consumption of alcohol were more likely to have universal helmet policies. Temperature (negative marginal effect) and precipitation (positive marginal effect) were also significant predictors. Health care spending per 1000 residents and most of the other demographic, road condition, or regional measures were not significant predictors, with the exception of lane miles per mile of public road (negative marginal effect) and percentage White residents (positive marginal effect).

Given the negative association between mandatory motorcycle rider education and universal helmet laws, we evaluated the determinants of mandatory rider education policies in a separate analysis. Few of the motorcycle-specific variables or political variables were significantly related to having a mandatory rider education law. States with more physicians, higher salaries for state legislators, and more moderate-leaning residents were more likely to have a mandatory rider education program for all or some riders.

We evaluated the robustness of the results for universal helmet

TABLE 1—Mean Values for all Variables, by Helmet Law Status: Continental United States, 1990–2005

	Universal Helmet Law (n = 336; 46.7%)	No Universal Helmet Law (n = 384; 53.3%)	Full Sample (N = 720)
State motorcycle-specific variables			
MOA members per 100 000 residents,*** mean (SD)	12.227 (7.35)	15.907 (6.509)	14.190 (7.153)
Major motorcycle rally,*** mean	0.030	0.130	0.083
Motorcycle registrations per 1000 residents,*** mean (SD)	17.300 (7.570)	30.427 (13.845)	24.301 (13.106)
Value of the motorcycle-related retail marketplace (thousands of $) per 1000 residents,*** constant 2000 $, mean (SD)	60.517 (25.692)	86.505 (41.260)	74.377 (37.185)
Percentage of neighboring states with universal helmet laws,*** % (SD)	63.280 (25.615)	38.614 (28.759)	50.125 (29.966)
Physicians per 1000 residents,*** mean (SD)	3.004 (0.810)	2.784 (1.622)	2.886 (1.311)
State political variables			
Republican governor,*** mean	0.393	0.664	0.537
Republican seats in state legislature,*** % (SD)	39.883 (12.581)	51.709 (15.151)	46.190 (15.195)
Recent change in party control in the legislature	0.065	0.042	0.053
Annual salary (thousands) of state legislators,*** constant 2000 $, mean (SD)	26.467 (22.588)	16.675 (16.101)	21.245 (19.993)
Liberal,*** % (SD)	21.140 (4.922)	19.782 (5.573)	20.416 (5.319)
Moderate, % (SD)	43.906 (4.399)	44.293 (6.292)	44.112 (5.490)
State traffic policy variables			
Mandatory motorcycle rider education,*** mean	0.313	0.508	0.417
0.08 BAC limit per se, mean	0.318	0.310	0.314
Primary seatbelt law,*** mean	0.330	0.211	0.267
Other state explanatory variables			
Per capita alcohol consumption,*** gallons, mean (SD)	2.208 (0.442)	2.312 (0.512)	2.264 (0.483)
Average annual temperature,*** °F, mean (SD)	57.462 (7.292)	53.364 (7.678)	55.276 (7.769)
Average annual precipitation,*** inches, mean (SD)	41.489 (15.375)	31.079 (14.670)	35.937 (15.868)
Vehicle miles traveled (millions) per 1000 residents, mean (SD)			
Rural***	5.570 (2.586)	6.972 (3.044)	6.318 (2.923)
Urban***	6.740 (1.638)	6.113 (1.792)	6.405 (1.749)
Lane miles per mile of public road,*** mean (SD)	2.088 (0.120)	2.074 (0.072)	2.080 (0.097)
White residents,*** % (SD)	82.200 (9.666)	89.072 (7.429)	85.865 (9.204)
Per capita income (thousands),** constant 2000 $, mean (SD)	26.124 (4.701)	25.485 (4.276)	25.783 (4.488)
Health care spending (millions) per 1000 residents, constant 2000 $, mean (SD)	4.835 (0.799)	4.799 (0.867)	4.816 (0.836)
Census region			
Northeast,* mean	0.217	0.161	0.188
Midwest,*** mean	0.134	0.352	0.250
West,*** mean	0.176	0.276	0.229
South,*** mean	0.473	0.211	0.333

Note. MOA = Motorcycle Owners of America; BAC = blood alcohol content. Full sample includes all states from 1990 to 2004 except Alaska, Hawaii, and Washington, DC. We used the Kruskal-Wallis test for equality of populations to test for differences between the 2 helmet groups.
*$P < .10$; **$P < .05$; ***$P < .01$.

policies to the exclusion of various policy controls and changes in the estimation approach. First, the control for whether a state had a mandatory rider education policy was excluded from the analysis. Next, we excluded the indicator variable for a primary seatbelt law. We also ran the models without lagging the explanatory variables 1 year behind the helmet policy variable. Finally, we estimated the

TABLE 2—Regression Coefficients, Robust Standard Errors, and Marginal Effects for Universal Helmet Law and Mandatory Motorcycle Rider Education (N = 720): Continental United States, 1990–2005

	Universal Helmet Law		Mandatory Motorcycle Rider Education	
	Regression Coefficient (SE)	Marginal Effects	Regression Coefficient (SE)	Marginal Effects
State explanatory variables				
State motorcycle-specific variables				
MOA members per 100 000 residents	0.084* (0.050)	0.023	−0.048 (0.040)	−0.017
Major motorcycle rally	−0.390 (1.211)	−0.091	0.741 (0.837)	0.285
Motorcycle registrations per 1000 residents	−0.213*** (0.042)	−0.058	−0.005 (0.018)	−0.002
Value of the motorcycle-related retail marketplace (in thousands of $) per 1000 residents, constant 2000 $	−0.033** (0.013)	−0.009	0.003 (0.009)	0.001
Percentage of neighboring states with universal helmet laws	0.021*** (0.008)	0.006	0.002 (0.011)	0.001
Physicians per 1000 residents	0.176*** (0.052)	0.048	1.314* (0.711)	0.468
State political variables				
Republican governor[a]	−0.369* (0.209)	−0.102	−0.238 (0.288)	−0.085
Percentage of Republican seats in state legislature	−0.046*** (0.016)	−0.012	−0.009 (0.019)	−0.003
Recent change in party control in the legislature	0.645*** (0.194)	0.215	0.292 (0.187)	0.109
Annual salary (in thousands of $) of state legislators, constant 2000 $	0.058*** (0.013)	0.016	0.036*** (0.013)	0.013
Percentage liberal[b]	0.058*** (0.023)	0.016	0.023 (0.015)	0.008
Percentage moderate[b]	−0.008 (0.015)	−0.002	0.018* (0.010)	0.006
State traffic policy variables				
Mandatory rider education	−1.688*** (0.529)	−0.403		. . .
Universal helmet law		. . .	−1.346*** (0.472)	−0.446
0.08 BAC limit per se	1.019*** (0.357)	0.315	1.554*** (0.334)	0.555
Primary seatbelt law	0.587* (0.336)	0.178	1.545*** (0.469)	0.557
Other state explanatory variables				
Per capita alcohol consumption, gallons	2.112*** (0.622)	0.578	2.442*** (0.657)	0.871
Average annual temperature, °F	−0.113** (0.045)	−0.031	−0.124*** (0.047)	−0.044
Average annual precipitation, inches	0.047*** (0.012)	0.013	0.014 (0.016)	0.005
Vehicle miles (millions) traveled per 1000 residents				
Rural	0.174 (0.150)	0.048	−0.098 (0.114)	−0.035
Urban	0.219 (0.191)	0.060	0.423** (0.201)	0.151
Lane miles per mile of public road	−3.187** (1.329)	−0.872	0.408 (0.556)	0.146
Percentage White	0.072** (0.032)	0.020	0.146*** (0.045)	0.052
Per capita income (in thousands of $), constant 2000 $	−0.108 (0.104)	−0.030	−0.198** (0.091)	−0.071
Health care spending (in millions of $) per 1000 residents, constant 2000 $	−0.173 (0.535)	−0.047	0.242 (0.548)	0.086
Census region				
Northeast[c]	−0.204 (0.822)	−0.053	−3.016*** (1.025)	−0.535
Midwest[c]	0.211 (0.789)	0.060	−0.481 (0.879)	−0.160
West[c]	1.591 (0.975)	0.531	−1.321 (1.029)	−0.364
Constant	7.186 (6.893)		−16.213** (7.522)	

Note. MOA = Motorcycle Owners of America; BAC = blood alcohol content. Ellipses indicate that the variable was excluded from the regression. Full sample includes all states from 1990 to 2004 except Alaska, Hawaii, and Washington, DC. The baseline proportion for universal helmet law was 0.467 and 0.417 for mandatory motorcycle rider education. The dependent variable was equal to 1 if universal helmet (or mandatory motorcycle rider education) policy and 0 if no universal helmet (or mandatory motorcycle rider education) policy. No universal helmet law states included those with mandatory laws for young riders as well as those without a helmet policy. All models are lagged such that the helmet (or mandatory motorcycle rider education) policy from year $t + 1$ was regressed on explanatory variables from year t. Standard errors were adjusted for clustering on the state level. All models also controlled for time effects.

[a]Comparison is Democratic or Independent governor.

[b]Comparison is conservative.

[c]Comparison is South.

*$P < .10$; **$P < .05$; ***$P < .01$.

core model with logistic regression instead of univariate probit and then used ordered probit to estimate a model with a 3-category dependent variable: no helmet requirements or requirements for very young riders (15 years or younger; 10.1% of the sample), helmet policy for young riders (aged 16–20 years; 43.2% of the sample), and helmet policies for all riders (46.7% of the sample). Although some unique findings emerged from each of these specifications, the core results remained largely unchanged.

DISCUSSION

We analyzed the influence of the motorcycle industry, political factors, and other state-specific characteristics on universal helmet laws for motorcyclists, an important public health policy. As a secondary aim, we also analyzed the effects of these explanatory variables on the probability of having a mandatory motorcycle rider education program. Our findings supported the premise laid out in the conceptual framework that relatively small groups representing the motorcycle community can influence policy outcomes. More specifically, the overall strength of the motorcycle industry and rider community, primarily those factors related to votes and the industry's economic power, decreased the likelihood that a state had a universal helmet law. The exception to this finding was MOA members per capita, which was marginally significant and positively associated with a universal helmet policy. The heightened safety consciousness of these riders may reflect the fact that the average MOA member is in his or her late 40s, earns about $75 000 per year, and attended college.[44] The motorcycle rider community comprises diverse industry and community organizations, and a "motorcycle lobby" cannot be held entirely responsible for the status of helmet laws. As motorcycle sales increase and more women and older adults begin riding, such diversity of interests may actually weaken this constituency's influence.

Our analysis identified other important determinants of state helmet policies, including the partisanship of the state government and public opinion. Given the Republican Party's emphasis on reducing government intervention and increasing individual responsibility in terms of personal behavior, the political party finding is not necessarily surprising. The partisanship of the state legislature and changes in the composition of these bodies, however, appear to have a stronger effect on state helmet policies than whether the state has a Republican governor.

Many rider groups, even those opposed to mandatory helmet laws, are strong advocates of providing training and increasing funding for traffic safety research and driver education programs.[21] This may account in part for the negative association between mandatory rider education programs and universal helmet laws. Although the quality of rider education programs varies across states,[45] policymakers may view them as substitutes for universal helmet policies or as part of a compromise when amending universal helmet laws. The timing of the implementation of helmet laws and rider education programs may be one factor supporting this assertion. For example, Wisconsin's universal helmet policy was amended to apply to riders 17 years and younger in 1978, and a motorcycle rider education program was established 3 years later. Mandatory participation in the rider education program was approved for young riders in 1993 after a failed attempt to reinstate a universal helmet policy.[46,47] In addition, an amendment was almost introduced (but ultimately was not) during a debate in 1995 in the US Congress to require states to have motorcycle rider education programs instead of universal helmet laws.[48]

Limitations

Our analysis was subject to a few important data and methodologic limitations. Reporting of registration data varied slightly as data collection systems were updated and modified. Data regarding motorcycle vehicle miles traveled by state, number of trauma surgeons, donations by motorcycle political action committees, and knowledge of state legislators about motorcycle fatalities were unavailable. Third, we intended to include a variable for state-specific membership in large organizations such as the American Motorcycle Association (AMA), ABATE, or the Harley Owners Group (HOG), but none released the information. Although MOA is not necessarily representative of larger motorcycle organizations, it has a politically connected and active membership. Fourth, many key variables were included in the analysis and the dependent variable was lagged but omitted variable bias and reverse causality cannot be ruled out. Finally, within-state changes in helmet policies did not occur often enough during this period to use state fixed-effects models, which better control for unmeasured state characteristics.

Conclusions

Despite these limitations, these core findings have important implications for public health officials and policymakers concerned about rising motorcycle fatalities. The diverse interests of various rider groups should encourage public health officials to seek out partnerships with those who support universal helmet laws from the motorcycle community, the public, and organizations such as the American College of Surgeons. Republican gains in a state legislature or gubernatorial victory may put an existing universal helmet law in jeopardy, whereas the election of Democratic politicians or a change in a neighboring states' helmet policy may reflect a climate that is conducive to stricter legislation.

The status of helmet laws in the United States is the result of several complex factors that may not be easily altered. Studies clearly show that motorcycle helmets reduce the risk of head injuries and fatalities. Additional research is needed about how enforcement of universal helmet laws and the stringency of penalties, which range from fines to license suspension, impact the effectiveness of such laws. The use of noncompliant helmets is a concern in

states with mandatory helmet laws,[49] and motorcycle helmet use by all riders decreased from 63% in 1994 to 51% in 2006.[50] These trends, along with the rise in motorcycle fatalities, suggest that it may be time to supplement the traditional reliance on regulations and mandates with new and creative approaches to promoting helmet use.[51] Incorporating other models of public health intervention and health promotion, such as incentives (e.g., insurance discounts) and penalties (e.g., license fees), may be more beneficial and effective in the long run. These approaches may be especially relevant in states that are unlikely to soon pass a universal helmet policy because of political, economic, and ideological conditions. ■

About the Authors

Jenny Homer is with the Sociology Research Center, University of Miami, Coral Gables, FL. Michael French is with the Department of Sociology and the Sociology Research Center, University of Miami, Coral Gables.

Requests for reprints should be sent to Michael French, PhD, Department of Sociology, University of Miami, PO Box 248162, Coral Gables, FL 33124-2030 (e-mail: mfrench@miami.edu).

This article was accepted May 15, 2008.

Contributors

M. French developed the initial topic for the article and provided guidance to J. Homer, who conducted the analysis and led the data collection effort and writing. Both authors developed the model for the analysis, reviewed the initial findings, interpreted results, and revised and edited the essay.

Acknowledgments

Financial assistance for this study was provided by the National Institute on Alcohol Abuse and Alcoholism (grants R01 AA13167 and R01 AA015695).

We gratefully acknowledge helpful comments from Gulcin Gumus, Hai Fang, and Michael Morrisey. Additional thanks are due to Sean Li, Marcia Mowbray, Ana Guzman, Rosemary Kenney, Adrienne Milner, Lauren Tapsell, Colleen Trifilo, Kristen Smith, Jamila Wade, Venessa Wilson, Pamela Valbuena, Spencer Weinkle, Meghan Ewing, and Robin Prize for research assistance and to Carmen Martinez and William Russell for editorial assistance.

Note. The authors are entirely responsible for the research and results reported, and their position or opinions do not necessarily represent those of the National Institute on Alcohol Abuse and Alcoholism or the University of Miami.

Human Participant Protection

This study was approved by the University of Miami's institutional review board.

References

1. *Traffic Safety Facts 2005*. Washington, DC: National Highway Traffic Safety Administration, National Center for Statistics and Analysis; 2005. DOT HS 810 631.

2. White JB. Eyes on the road: bikers fight to ride free—and win; data show increase in fatalities among motorcyclists. *Wall Street Journal* (online edition). July 30, 2007. Available at: http://online.wsj.com/public/article/SB118555607710880466.html. Accessed July 21, 2008.

3. Morrison DS, Petticrew M, Thomson H. What are the most effective ways of improving population health through transport interventions? Evidence from systematic reviews. *J Epidemiol Community Health.* 2003;57:327–333.

4. Liu B, Ivers R, Norton R, Boufous S, Blows S, Lo SK. Helmets for preventing injury in motorcycle riders. *Cochrane Database Syst Rev.* 2004;(2):CD004333.

5. Rowland J, Rivara F, Salzberg P, et al. Motorcycle helmet use and injury outcome and hospitalization costs from crashes in Washington State. *Am J Public Health.* 1996;86:41–45.

6. Hurt HH, Ouellet JV, Thom DR. *Motorcycle Accident Cause Factors and Identification of Countermeasures.* Volume 1: Technical Report. Washington, DC: National Highway Traffic Safety Administration; 1981. DOT HS 805 862.

7. Norvell DC, Cummings P. Association of helmet use with death in motorcycle crashes: a matched-pair cohort study. *Am J Epidemiol.* 2002;156:483–487.

8. Bledsoe GH, Li G. Trends in Arkansas motorcycle trauma after helmet law repeal. *South Med J.* 2005;98:436–440.

9. Sass TR, Zimmerman PR. Motorcycle helmet laws and motorcyclist fatalities. *J Regul Econ.* 2000;18:195–215.

10. Houston DJ, Richardson LE Jr. Motorcycle safety and the repeal of universal helmet laws. *Am J Public Health.* 2007; 97:1–7.

11. Robertson LS. An instance of effective legal regulation: motorcyclist helmet and daytime headlamp laws. *Law & Society.* 1976;10:468–477.

12. Insurance Institute for Highway Safety. Laws and regulations: helmet use laws. Available at: http://www.iihs.org/laws/helmet_history.html. Accessed January 2, 2008.

13. Motorcycle Riders Foundation. *President Clinton Signs NHS Bill. Includes Retroactive Repeal of Federal Helmet Law.* 1995. Available at: http://www.mrf.org/articles/1997/victory.html. Accessed April 14, 2008.

14. Jones MM, Bayer R. Paternalism and its discontents: motorcycle helmet laws, libertarian values, and public health. *Am J Public Health.* 2007;97:2–11.

15. Colgrave J, Bayer R. Manifold restraints: liberty, public health, and the legacy of *Jacobson v. Massachusetts*. *Am J Public Health.* 2005;95:571–577.

16. Ostrom V, Ostrom E. Public choice: a different approach to the study of public administration. *Public Admin Rev.* 1971; 31:203–216.

17. Buchanan JM, Tullock G. *The Calculus of Consent: Logical Foundations of Constitutional Democracy.* Ann Arbor: University of Michigan Press; 1962.

18. Ohsfeldt RL, Morrisey MA, Nelson L, et al. The spread of state 'any willing provider' laws. *Health Serv Res.* 1998; 33:1537–1562.

19. Stigler GJ. The theory of economic regulation. *Bell J Econ Manage Sci.* 1971; 2:1–21.

20. Peltzman S. Toward a more general theory of regulation. *J Law Econ.* 1976; 19:211–240.

21. Poole IJ. Bikers a surprising force in grass-roots lobbying. *CQ Weekly.* May 16, 2005;1287–1289.

22. Baker S. On lobbies, liberty, and the public good. *Am J Public Health.* 1980; 70:573–575.

23. Wasserstrom AS. Validity of traffic regulations requiring motorcyclists to wear helmets or other protective headgear. *Am Law Rep.* 1999;72(5):607.

24. Ringquist EJ. Policy influence and policy responsiveness in state pollution control. *Policy Stud J.* 1994;22:25–43.

25. Soule SA. Going to the chapel? Same-sex marriage bans in the United States, 1973–2000. *Soc Prob.* 2004; 51:453–477.

26. Barrilleaux C, Holbrook T, Langer L. Electoral competition, legislative balance, and American state welfare policy. *Am J Polit Sci.* 2002;46:415–427.

27. Kousser T. The politics of discretionary Medicaid spending, 1980–1993. *J Health Polit Policy Law.* 2002;27:639–671.

28. Iglehart JK. Health policy report: politics and public health. *N Engl J Med.* 1996;334:203–207.

29. Francia PL, Green JC, Herrnson PS, Powell LW, Wilcox C. Limousine liberals and corporate conservatives: the financial constituencies of the Democratic and Republican Parties. *Soc. Sci. Q.* 2005;86: 761–778.

30. Varian B. Bikers embrace freedom to ride without helmets. *St Petersburg Times.* July 17, 2000;1.

31. Geyelin M. Judge dismisses suit challenging Florida's motorcycle helmet law. *St Petersburg Times.* May 3, 1988;3B.

32. Yardley W. Bill lets bikers doff their helmets. *St Petersburg Times.* May 4, 2000;1B.

33. Lundegaard K. Risky riders. *Wall Street Journal.* November 30, 2004;A1.

34. VerSteeg JW. Bikers free, at a cost to Floridians. *Palm Beach Post.* July 4, 2000;14A.

35. Hayasaki E. Bikers can grin, bare it. *Tampa Tribune.* June 30, 2000;1.

36. Muller A. Florida's motorcycle helmet law repeal and fatality rates. *Am J Public Health.* 2004;94:556–558.

37. Hotz GA, Cohn SM, Popkin C, et al. The impact of a repealed motorcycle helmet law in Miami-Dade County. *J Trauma.* 2002;52:469–474.

38. Becker GS. A theory of competition among pressure groups for political influence. *Q J Econ.* 1983;XCVIII:371–400.

39. Knudson MM, Schermer S, Speetzen L; the Subcommittee on Injury Prevention and Control for the Committee on Trauma of the American College. Motorcycle helmet laws: every surgeon's responsibility. *J Am Coll Surg.* 2004;199:261–264.

40. Berry FS, Berry WD. State lottery adoptions as policy innovations: an event history analysis. *Am Polit Sci Rev.* 1990;84:395–415.

41. Maestas C. Professional legislatures and ambitious politicians: policy responsiveness of state institutions. *Legis Stud Q.* 2000;25:663–690.

42. Erikson RS, Wright GC, McIver JP. *Statehouse Democracy: Public Opinion, and Policy in the American States.* Cambridge, England: Cambridge University Press; 1993.

43. Motorcycle Safety Foundation (MSF). *Cycle Safety Information. State Motorcycle Rider Education Programs*; 2006. Available at: http://www.msf-usa.org. Accessed April 14, 2008.

44. Schmidt B. BMW riders' return rallies economy. *Spokesman Review.* July 16, 2004;1A.

45. Baldi S, Baer JD, Cook AL. Identifying best practices states in motorcycle rider education and licensing. *J Safety Res.* 2005;36:19–32.

46. Dean J. Motorcycle law is now in effect. *Capital Times* [Madison, WI]. March 30, 1994;10A.

47. Motorcycle helmet law introduced. *Wisconsin State Journal.* January 9, 1992;2B.

48. Congressional Record—Senate. National Highway System Designation Act. Vol. 141(101): 141 Cong Rec S 8656 (June 20, 1995).

49. Peek-Asa C, McArthur DL, Kraus JF. The prevalence of non-standard helmet use and head injuries among motorcycle riders. *Accid Anal Prev.* 1999;31:229–233.

50. Glassbrenner D, Ye J. *Motorcycle Helmet Use in 2006—Overall Results.* Traffic Safety Facts Research Note. Washington, DC: National Highway Traffic Safety Administration; 2006. DOT HS 810 678.

51. Gostin LO. Public health law: a renaissance. *J Law Med Ethics.* 2002;30:136–140.

Transitions in State Public Health Law: Comparative Analysis of State Public Health Law Reform Following the Turning Point Model State Public Health Act

Benjamin Mason Meier, JD, LLM, MPhil, James G. Hodge Jr, JD, LLM, and Kristine M. Gebbie, DrPH, RN

Given the public health importance of law modernization, we undertook a comparative analysis of policy efforts in 4 states (Alaska, South Carolina, Wisconsin, and Nebraska) that have considered public health law reform based on the Turning Point Model State Public Health Act.

Through national legislative tracking and state case studies, we investigated how the Turning Point Act's model legal language has been considered for incorporation into state law and analyzed key facilitating and inhibiting factors for public health law reform.

Our findings provide the practice community with a research base to facilitate further law reform and inform future scholarship on the role of law as a determinant of the public's health. (*Am J Public Health.* 2009;99:423–430. doi: 10.2105/AJPH.2008.140913)

POLICYMAKERS, SCHOLARS, and public health officials have argued that state-based public health laws are ripe for reform.[1,2] Despite a burgeoning research agenda on the effect of law on the public's health,[3,4] few studies have examined the enabling statutes that create state and local public health agencies and empower them to prevent disease and promote health.[5–7] This gap in legal analysis was recognized in 2 recent Institute of Medicine reports,[8,9] increasing the interest of state public health officials in modernizing the statutory basis of their practice.

Beginning in 2000, the Turning Point Public Health Statute Modernization Collaborative (Turning Point Collaborative)—part of a larger Robert Wood Johnson Foundation effort to strengthen public health infrastructures[10]—brought together state representatives with federal, tribal, and local public health partners and private sector actors (e.g., health professionals and institutions) to "transform and strengthen the legal framework for the public health system through a collaborative process to develop a model public health law."[11] After 3 years of development, the Turning Point Collaborative released the final version of the Turning Point Model State Public Health Act (Turning Point Act) in September 2003,[12] proposing it as a template of key public health powers for state, tribal, and local governments considering public health law modernization. The effectiveness of the Turning Point Act as a catalyst for law reform has not yet been determined.[13]

With the Turning Point Act serving as a basis for several state public health law reform efforts, we hypothesized that consideration of the act led to varied reform initiatives and responses according to distinct underlying policy conditions in each state. We believed that a comparative analysis would elucidate the approaches most likely to support modernization efforts and assist public health advocates and